

A new species of the mantidfly genus *Euclimacia* from Vietnam (Neuroptera, Mantispidae)

Sarah Ehlers¹, Hongyu Li², Lukas Kirschey¹, Michael Ohl¹

¹ Leibniz-Institut für Evolutions- und Biodiversitätsforschung, Museum für Naturkunde, Invalidenstr. 43, D-10115 Berlin, Germany

² Department of Entomology, China Agricultural University, Beijing 100091, China

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Corresponding author: Sarah Ehlers (sarah.ehlers@mfn.berlin)

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Abstract

A new species of the family Mantispidae (Neuroptera) from Vietnam is described. *Euclimacia radioquaesentis* **sp. nov.** shows a unique colour pattern, which is distinctive within the genus. The colouration and morphology of both sexes of the new species are described in detail and illustrated. The naming of the new species is linked to a popular citizen-science event in choosing the name for this species (and three other species from different undescribed species by taxonomists of the Museum für Naturkunde Berlin).

Key Words

Adaption, lacewings, mimicry, new species, parasitoid, polymorphism, sexual dimorphism, Southeast Asia, wasp mimic

Introduction

The Mantispidae is a family within the holometabolous order Neuroptera, which has a remarkable morphology and interesting, but so far scarcely studied biology. The larvae of the subfamily Mantispinae are predatory and feeding on spider eggs (Snyman et al. 2020). The larvae of Symphrasinae were observed on various insect pupae and, for Drepanicinae, there is one recorded interaction with a spider (Theridiidae) without further details (Austin 1985). So far, there is only one report on Calomantispinae from a laboratory experiment. Here, larvae were reared on various insect pupae and larvae, as well as on spider eggs and paralysed spiders (MacLeod and Redborg 1982). Mantispidae larvae undergo a hypermetamorphosis with first developmental stage mobile and actively search for food sources (Snyman et al. 2020). An interesting type of behaviour is spider boarding, exhibited by some species of the subfamily Mantispinae. In this case, a larva of the first instar climbs on to a female spider and remains there until she begins to produce her egg sac (Redborg 1998). The larva then intrudes into the egg sac and develops into the second and later third instar. The legs of the third in-

star are significantly smaller, which restricts locomotion (Snyman et al. 2020).

Adult mantispids are characterised by a triangular head, raptorial forelegs and an elongated tubular prothorax, which makes them appear very similar to mantids (Ardila-Camacho et al. 2021). Adult mantispids are effective ambush predators on other insects. In some species, it is known that they also feed on pollen and nectar (Boyden 1983). Many species show wasp mimicry (Snyman et al. 2018).

Formerly, this family was assumed to be monophyletic, with its extant members classified into four subfamilies: Mantispinae, Calomantispinae, Symphrasinae and Drepanicinae (e.g. Lambkin (1986a, b)). However, recent morphological and molecular studies have convincingly demonstrated that Mantispidae is paraphyletic, with the Symphrasinae being a subfamily in the Rhachiberothidae (Winterton et al. 2018; Ardila-Camacho et al. 2021). The relationships amongst the Calomantispinae, Drepanicinae and Mantispinae, which might be considered as the Mantispidae *sensu stricto*, are still controversial (see Ardila-Camacho et al. (2023)).

Euclimacia Enderlein, 1910 belongs to the most diverse subfamily Mantispinae, which comprises of 320

species in 35 genera (Ohl 2004b; Oswald and Machado 2018). Adult *Euclimacia* can be easily distinguished from other mantispid genera by the disc-like and symmetrical flagellomeres, the short pronotum (approximately of the same length as the pterothorax), pronounced dorsal humps and lateral maculae and a forked 2A vein in the fore-wing. Species of *Euclimacia* exhibit a high degree of colour variation. Many mimic different species of aculeate wasps from different families. Colour patterns in *Euclimacia* vary from almost completely black body colour with blue shimmering wings similar to some Pompilidae to bright yellow and black-striped species, which resemble species of the social wasp family Vespidae (Ohl 2004a; Soh et al. 2022). Currently, there are 33 valid species in this genus, distributed in Oriental and Australasia (Ohl 2004b; Kaur et al. 2021), summarised in Table 1. In 1910, Enderlein initially described *Euclimacia*, designating *E. partita* as the type species. The most comprehensive revision of this genus was performed by Handschin in 1961. At that time, only 19 species were known in *Euclimacia*, but Handschin only included those that were available to him, i.e. a total of 11 species. Of these 11 species, however, he could

only personally study the types of four species. In addition, Handschin described six new species.

In the present study, we describe a new species from Vietnam (Fig. 1B), showcasing a unique colour pattern, which distinguishes it from all other described species in *Euclimacia*.

Material and methods

The type series is part of the large collection of Southeast Asian Mantispidae deposited in the Royal Belgium Institute of Natural Sciences, Brussels, Belgium. One paratype is housed in the collections of the Museum für Naturkunde, Berlin, Germany.

The genital preparation was made from one paratype. Punctures were made in the area of the fourth abdominal segment with the aid of an insect pin size 0. Polyethylene foam was cut into required pieces, which were attached to the pinned specimen with needles to stabilise it for the preparation. The abdomen was very carefully perforated all around until the posterior part could be detached by

Table 1. Overview of the currently valid *Euclimacia* species and their known distribution.

Species	Distribution
<i>Euclimacia badia</i> Okamoto, 1910	Taiwan, Japan
<i>Euclimacia basiflava</i> Handschin, 1961	Malaysia
<i>Euclimacia burmanella</i> (Westwood, 1867)	Myanmar
<i>Euclimacia celebica</i> Handschin, 1961	Indonesia (Sulawesi)
<i>Euclimacia cottami</i> Navás, 1914	India (Sikkim)
<i>Euclimacia flavicauda</i> Esben-Petersen, 1917	Indonesia (Sumatra)
<i>Euclimacia flavocincta</i> Stitz, 1913	Solomon Islands
<i>Euclimacia fusca</i> Stitz, 1913	Taiwan, Japan
<i>Euclimacia gerstaeckeri</i> Banks, 1920	Singapore, Malaysia
<i>Euclimacia grandis</i> (Guérin-Méneville, 1831)	Indonesia (Ambon)
<i>Euclimacia horstaspoecki</i> Ohl, 2004	Thailand
<i>Euclimacia jacobsoni</i> Handschin, 1961	Indonesia (Sumatra)
<i>Euclimacia metallica</i> Esben-Petersen, 1917	Indonesia (Sulawesi, Sumatra)
<i>Euclimacia morosa</i> (Gerstaecker, 1893)	Borneo, Philippines (Palawan)
<i>Euclimacia nelsoni</i> Navás, 1914	Sri Lanka
<i>Euclimacia nicobarica</i> Kaur, 2021	India (Andaman Islands, Nicobar Islands)
<i>Euclimacia nigra</i> Handschin, 1961	Indonesia (Java)
<i>Euclimacia nodosa</i> (Westwood, 1847)	India (Assam)
<i>Euclimacia nuchalis</i> (Gerstaecker, 1885)	Australia (New South Wales, Northern Territory, Queensland).
<i>Euclimacia partita</i> Enderlein, 1910	Indonesia (Sulawesi)
<i>Euclimacia radioquaesentis</i> Ehlers, sp. nov.	Vietnam
<i>Euclimacia regina</i> Esben-Petersen, 1917	Indonesia (Java, Sunda Islands), Singapore
<i>Euclimacia rhombica</i> Navás, 1914	Myanmar
<i>Euclimacia rufa</i> Esben-Peterson, 1928	Indonesia (Sumatra)
<i>Euclimacia ruficauda</i> Enderlein, 1910	Indonesia (Sulawesi)
<i>Euclimacia rufocincta</i> Handschin, 1961	Borneo
<i>Euclimacia similis</i> Kaur, 2021	India (Madhya Pradesh)
<i>Euclimacia superba</i> Lambkin, 1987	Australia (Queensland)
<i>Euclimacia tagalensis</i> Banks, 1914	Philippines (Luzon)
<i>Euclimacia torquata</i> Navás, 1914	Australia (New South Wales, Queensland), New Guinea
<i>Euclimacia triangularis</i> Handschin, 1961	Philippines
<i>Euclimacia vespiformis</i> Okamoto, 1910	Taiwan, Japan
<i>Euclimacia woodhousei</i> Navás, 1914	India (Sikkim)
<i>Euclimacia zonalis</i> Navás, 1914	Indonesia (Sulawesi)

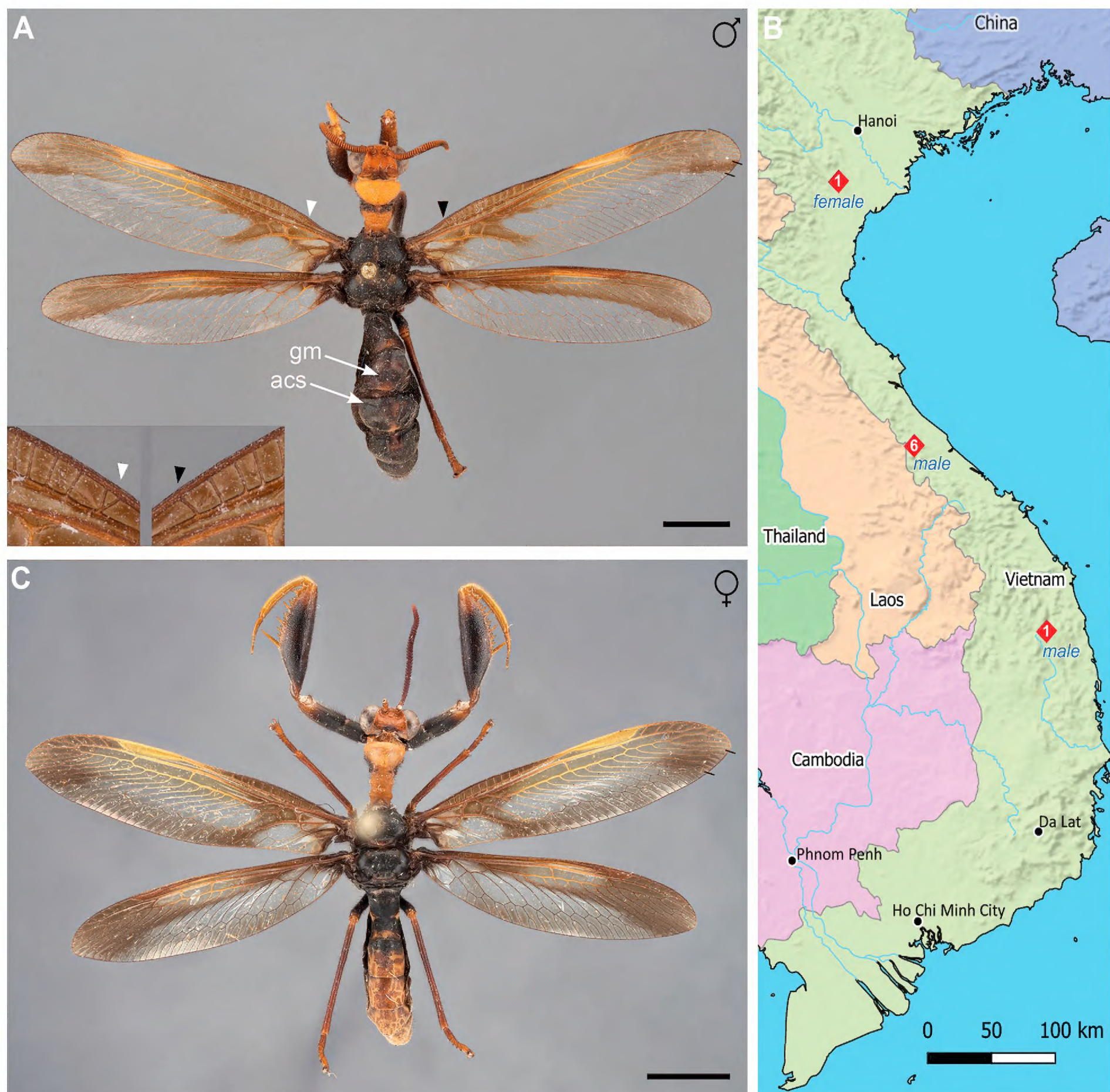


Figure 1. *Euclimacia radioquaesentis* sp. nov. male holotype and female paratype with distribution map. **A.** Habitus dorsal holotype male. Insert shows asymmetrical bifurcation between left and right costal area of fore-wings. Antecostal sutures (*acs*) and glabrous marks (*gm*) visible. The two black lines on the margin of the wing apex of the right fore-wing indicate the width of the oblique apical dark band; **B.** Localities (red rhombus) in Vietnam of the *radioquaesentis* type series. The number in the rhombus symbol indicates the count of specimens in this locality; **C.** Female paratype *radioquaesentis* dorsal view. The two black lines on the margin of the wing apex of the right fore-wing indicate the width of the oblique apical dark band. Scale bars: 5 mm (**A**, **B**).

a gentle levering action of the needle. The dissected abdominal end was left in 15% potassium hydroxide solution for approx. 21 h, then rinsed with distilled water and transferred to glycerol.

Images were taken with a Sony a7rIII and a Sony Makro G OSS 90mm f 2.8 lens for the habitus and a Canon MP-E 65mm f 2.8 lens for the details. Multi-focus imaging was facilitated by a Novoflex Castel-Mikro stepping motor-controlled focusing rack. To take the images, the software Capture One was used. For stacking, the software Helicon Focus was used. Genital images were made

with a Leica Z16 APO A motorised macroscope with a Leica DFC camera. Measurements were done with Fiji (ImageJ) Version 2.1.0/1.53c.

Photos were post-processed with Adobe Photoshop version CC 2019 and arranged and labelled with Adobe InDesign version 19.2.

Illustrations were made with Adobe Illustrator version 25.0.

Distribution map was generated with QGIS version 3.16 Hannover, Natural Earth Data and Adobe Photoshop version CC 2019.

The terminology is based on Snodgrass (1935), Lambkin (1986a), U. Aspöck and H. Aspöck (2008) and Ardi-la-Camacho (2021).

Results

Class Insecta Linnaeus, 1758

Order Neuroptera Linnaeus, 1758

Family Mantispidae Leach, 1815

Subfamily Mantispinae Leach, 1815

Genus *Euclimacia* Enderlein, 1910

Type species. *Euclimacia partita* Enderlein, 1910: 366, by original designation.

***Euclimacia radioquaesentis* sp. nov.**

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Etymology. The species epithet is made up of two words ‘radio’ and ‘quaesentis’. The latter derives from Latin and means ‘searched for’. The name was chosen as part of a radio show. Citizens were invited to submit name suggestions. The most suitable was *radioquaesentis* – searched for on the radio.

Material examined. *Holotype.* VIETNAM • ♂; Quang Tri, Huong Hoa Nature Reserve; 16°56'15"N, 106°34'52"E; 400 m; 7–10 Nov. 2007; G. Csorba leg., T. S. Nguyen leg., D. T. Pham leg., T. T. Nguyen leg., X. N. Nguyen leg.; light trap; CSOVI – Vietnam No. 92; coll. mfn-berlin.de_u_8bfa03; ISNB.

Paratypes. VIETNAM • 4 ♂; Quang Tri, Huong Hoa Nature Reserve; 16°56'15"N, 106°34'52"E; 400 m; 7–10 Nov. 2007; G. Csorba leg., T. S. Nguyen leg., D. T. Pham leg., T. T. Nguyen leg., X. N. Nguyen leg.; light trap; CSOVI – Vietnam No. 92; coll. mfn-berlin.de_u_7e303d, coll. mfn-berlin.de_u_29a944, coll. mfn-berlin.de_u_199711, coll. mfn-berlin.de_u_93bd60; ISNB • 1 ♂; same collection data as for preceding; coll. mfn-berlin.de_u_5ea2b5; ZBM • 1 ♂; Gia Lai, Kon Chu Rang Nature Reserve; 14°28'28"N, 108°32'27"E; 1200 m; 13–20 Jul. 2018; J. Constant leg., J. Bresseel leg., X. Vermeersch leg.; GTI Project, I.G.: 33.769; coll. mfn-berlin.de_u_6c2cbd; ISNB • 1 ♀; Ninh Binh, Cuc Phuong National Park; 11–18 Jul. 2010; J. Constant leg., P. Limbourg leg.; ISNB.

Diagnosis. The combination of colour characters in the new species is unique within *Euclimacia*. The contrast between the head and prothorax and the rest of the thorax and abdomen is striking. The prothorax and head have a distinct yellow colour, the remaining thorax is almost uniformly black. The abdomen of the male is also almost completely black with only a few brown markings. The female has a brownish abdomen with a black base. The wing colour is also unique in combination with the body colouration. The wings of *E. radioquaesentis* have the prominent feature of differently-coloured pterostigmata in fore and hind wing. Whereas the fore-wing pterostig-

ma is yellow, the hind-wing pterostigma is brown. There are currently six species in *Euclimacia* with this diagnostic character, but these species differ distinctly in body colouration. Whereas in *E. radioquaesentis* sp. nov., the head and the prothorax are markedly yellow, in the other six species both parts are either ferruginous (*E. rhombica* Navás, 1914), reddish-brown (*E. morosa* (Gerstäcker, 1893); *E. zonalis* Navás, 1914; *E. regina* Esben-Petersen, 1917; *E. rufocincta* Handschin, 1961) or completely black (*E. gerstaeckeri* Banks, 1920).

Description. Measurements and ratios [in mm]. The given size range of each defined measurement area comprises minimum and maximum measured values of all seven specimens: Minimum frontal eye distance [WBE]: male 1.32–1.56; female 1.05. Maximum frontal head width including eyes [WAE]: male 3.96–4.44; female 3.25. Pronatal length, measured lateral from the anterior margin of the prozona to the dorsal basis of the prothorax [PL]: male 3.6–4.53; female 3.6. Pronatal width at maculae [WAM]: male 1.92–2.41; female 1.5. Pronatal ratio (length: width) [PL: WAM]: male 1.81–2.03; female 2.4. Maximum fore femoral length [LFF]: male 6.42–7.39; female 5.44. Maximum fore femoral width [WFF]: male 2.1–2.52; female 1.6. Fore femoral ratio (length: width) [LFF: WFF]: male 2.55–3.52; female 3.4. Maximum hind femoral length [LHF]: male 4.61–5.46; female 3.85. Hind femoral ratio (Hind femoral length: head width including eyes) [LHF: WAE]: male 1.08–1.38; female 1.18. Fore-wing length (measured at the middle of the humeral plate to the outer apex of the wing) [LFW]: male 22.21–25.1; female 17. Fore-wing width (measured down from the base of the pterostigma at a right angle) [WFW]: male 4.8–5.1; female 4.08. Fore-wing ratio (length: width) [LFW: WFW]: male 4.48–4.95; female 4.15. Maximum length of fore-wing anterior radial cell II [Larp2]: male 4.19–5.2; female 3.02. Maximum width of fore-wing anterior radial cell II [Wrap2]: male 0.46–0.57; female 0.45. Fore-wing 2R1 ratio (length: width) [L2R₁: W2R₁]: male 8.6–10.57; female 6.71. Maximum hind-wing length (measured at the middle of the humeral plate to the outer apex of the wing): male 19.57–21.9; female 15.55. Maximum hind-wing width (measured down from the base of the pterostigma at a right angle): male 4.26–5.1; female 3.62. Hind-wing ratio (length: width): male 4.29–4.69; female 4.3.

Head. Holotype: Left antenna with 47 flagellomeres, right with 46 flagellomeres. Antennae of male paratypes ranging from 42 to 47 flagellomeres, left and right antennae with different number of flagellomeres in all specimens. Female: 41 flagellomeres right, left antennae missing.

Frons approximately square-shaped basically with outwardly curved lateral subantennal sutures (Fig. 2A). Frons glabrous, pilosity indistinct, frontal surface wrinkled (Fig. 2A). Clypeus trapezoidal, with long parallel side adjacent to frons and short parallel side adjacent to labrum, smoother surface than frons. Labrum ovoid, surface smooth with sparse pilosity. Frontal sutures form a curved line (Fig. 2B). Coronal suture runs straight from junction of frontal sutures to occiput.



Figure 2. *Euclimacia radioquaesentis* male. **A.** Head frontal view. The subantennal suture (*sas*) is curved outwards; **B.** Head and thorax in dorsal view. The epicranial sutures are comprised by the frontal sutures (*fs*) and the coronal suture (*cs*). A black transversal band runs along the pronatal groove over the maculae (*mc*) and the pronatal humps (*ph*). The horizontal dashed lines indicate the three areas of the prothorax, the prozona (*p1*), the metazona (*p2*) and the pronatal base (*p3*); **C.** Lateral view on head, thorax and forelegs. Scale bars: 1 mm (**A**); 2 mm (**B**, **C**).

Prothorax. Pronatal humps distinctly protruding (Fig. 3A). Female pronatal humps flat, weakly developed (Fig. 3B).

Wings. Number of subcostal veinlets and their bifurcations are asymmetric. Holotype: Left fore-wing costal space proximal to pterostigma with 17 subcostal veinlets, first (most proximal) subcostal veinlet counted as one, but with bifurcation in anterior direction (Fig. 1A). Right fore-wing with same number of subcostal veinlets, but without any bifurcation. Costal space of left hind-wing with 15 subcostal veinlets, right one with 14. Paratypes: Costal space with 11 to 16 subcostal veinlets, different in each wing of each specimen. Five of seven specimens with at least one bifurcated subcostal veinlet within costal space of fore-wing. Bifurcations never on both costal spaces in fore-wings, absent in costal spaces of hind-wings and subcostal spaces. One specimen with three bifurcations in one fore-wing. Female: Left fore-wing costal space with 12 subcostal veinlets, right fore-wing with 13 subcostal veinlets. Costal space of left hind-wing with 12 subcostal veinlets, right one with 16. Anterior ra-

dial cell II (*rarp2*) of the left hind-wing with cross-vein approximately centrally.

Abdomen. Abdominal segments with indistinct pilosity, dull appearance, without enlarged membranes or pores (Fig. 4E). Antecostal sutures (attachment for the longitudinal muscles) clearly visible in tergite III–VI in holotype and two further specimens (Fig. 1A). One transverse suture on each side of anterior margin of tergite, 1.5–1.8 mm long, smooth and without setae. Sutures not merging dorsally. Additional small (0.15 mm – 0.35 mm) circular and glabrous areas on tergum III–VIII, two on each side in the posterior third, below each other, one more dorsally and one at lower part of tergum, similar to surface of tergal sutures (Fig. 1A). Similar arrangement of those marks visible on sternum III–VII.

Male genitalia. Tergite IX laterally about three times as wide as dorsally (Fig. 4A, C). Sternite IX sternite posterior with apex pointing downwards (Fig. 4C). Ectoprocts with median lobes with short thick black setae (Fig. 4A). Mediuncus (gonocoxites X) elongated and arched from ventral to dorsal, approximately 1.1 mm long, anteri-

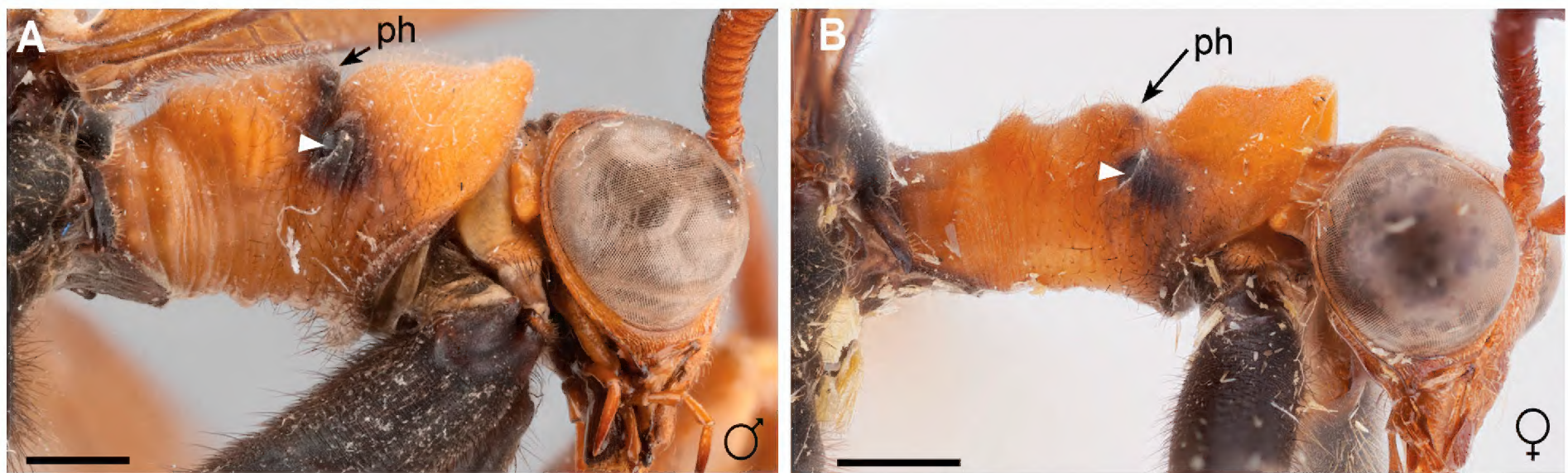


Figure 3. *Euclimacia radioquaesentis* prothorax of both sexes in lateral view. **A.** Male. Pronatal hump (white arrowhead) distinctly protruding. The black marking on the pronatal hump and the black marking on the macula are connected; **B.** Female. Pronatal hump (white arrowhead) barely protrudes. Dark marking on pronatal hump faintly present and not interfering with the black mark of the macula. Scale bars: 5 mm (**A**, **B**).

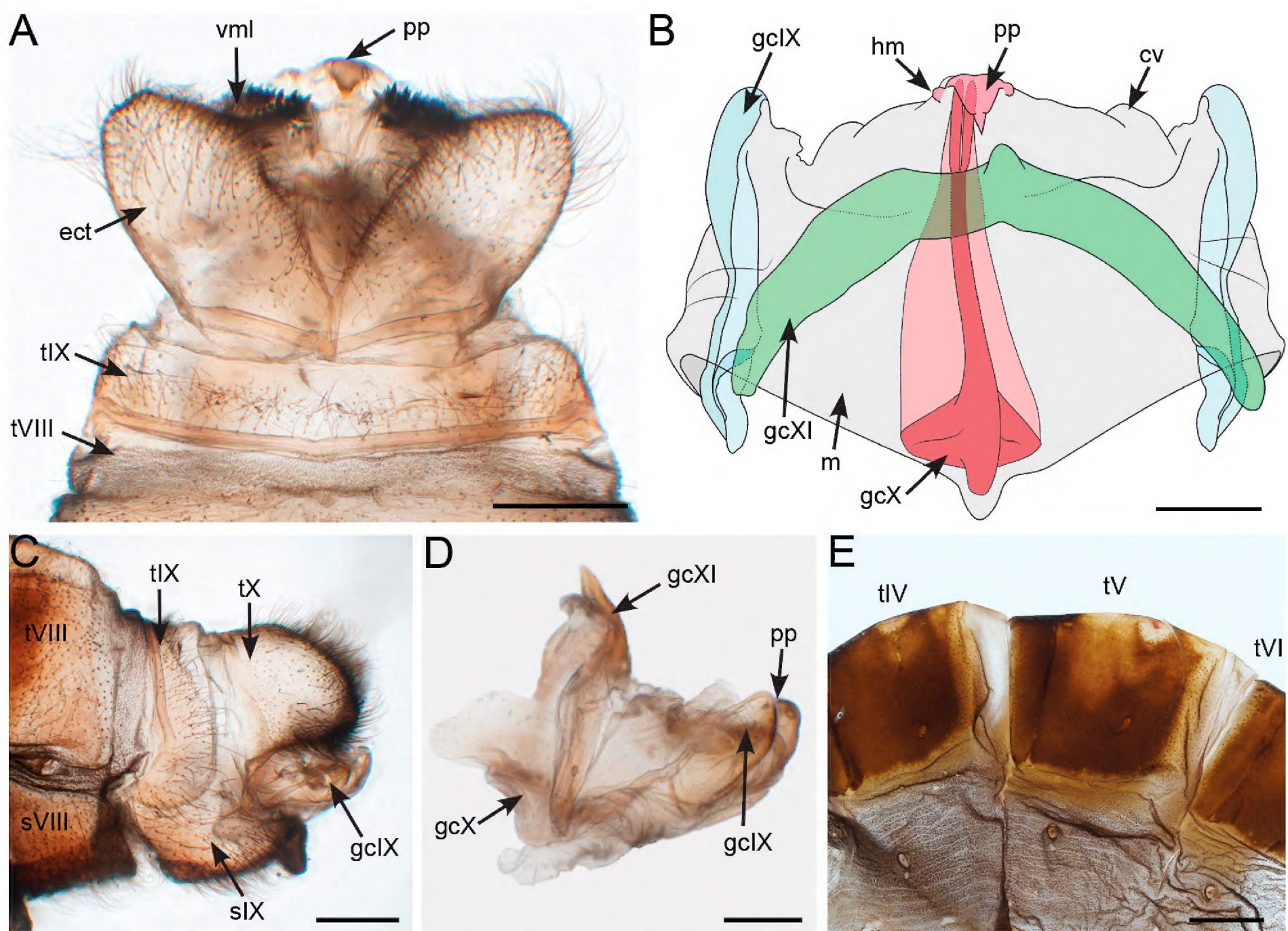


Figure 4. *Euclimacia radioquaesentis* male terminalia and inner genitals. **A.** Dorsal view of abdominal segment VII–IX; **B.** Illustration of the inner genitals from dorsal view with same orientation as in **A**; **C.** Male terminalia lateral view; **D.** Inner genitals from lateral view with same orientation as in **C**; **E.** Tergites IV–VI in lateral view. Abbreviations: cv, convex area; ect, ectoproct; gc, gonocoxite; hm, hypomere; m, membrane; pp, pseudopenis; s, sternite; t, tergite; vml, ventromedial lobus. Scale bars: 0.25 mm (**A**, **B**); 0.5 mm (**C**); 0.2 mm (**D**); 1 mm (**E**).

or two-thirds slender, posterior part broadened with two flanks, apex bifid (Fig. 4B, D). Pseudopenis (gonostyli X) originates posterior to apex of mediuncus, with broadened sclerotised trapezoidal lower region, short and acute process, strongly curved backwards (cranial direction). Two

globular protrusions (hypomeres) lateral at base of pseudopenis. Parameres (gonocoxites IX) slightly s-shaped in lateral plane, one part strongly sclerotised, pigmented, narrow in lower half and widens threefold in upper half, lobe-like shape. Inwardly projecting and less pigmented area

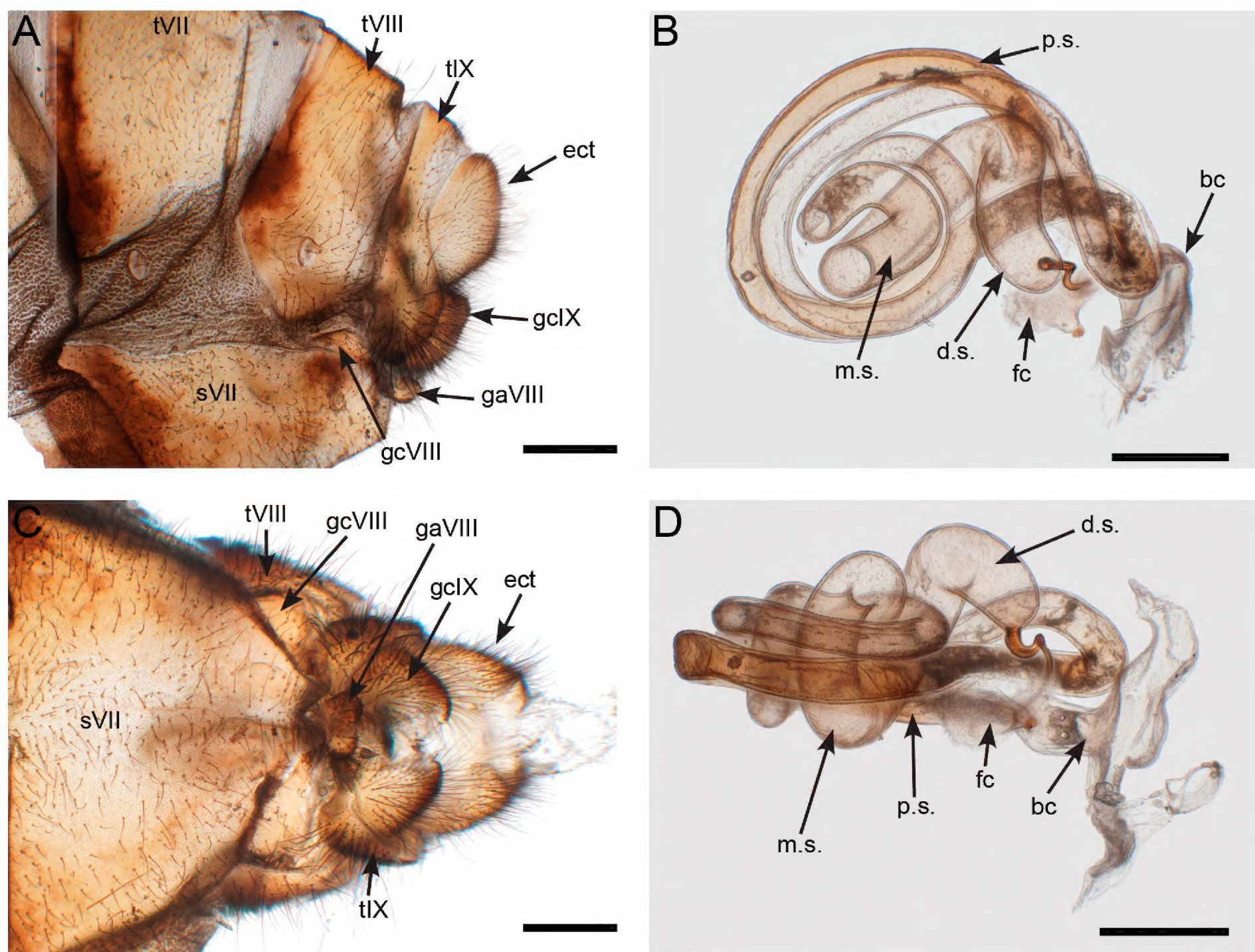


Figure 5. *Euclimacia radioquaesentis* female terminalia and inner genitals. **A.** Female terminalia lateral view; **B.** Spermatheca with bursa copulatrix lateral view; **C.** Terminalia ventral view; **D.** Spermatheca with bursa copulatrix ventral view. Abbreviations: *b.c.*, bursa copulatrix; *d.s.*, distal section of spermatheca; *ect*, ectoproct; *fc*, fertilisation canal; *gcd*, fertilisation canal duct; *ga*, gonapophysis; *gc*, gonocoxite; *m.s.*, medial section of spermatheca; *p.s.*, proximal section of spermatheca; *d.s.*, distal section of spermatheca; *s*, sternite; *t*, tergite. Scale bars: 0.25 mm (**A**, **B**); 0.5 mm (**C**); 0.2 mm (**D**); 1 mm (**E**).

that surrounds sclerotised part, merges into the connecting membrane. Membranous areas and most parts of pseudopenis covered with microspinulae. Gonarcus (gonocoxites XI) arch-shaped from dorsal view, with medial and slightly upwards pointing lobe, located on top of mediuncus-paramere-complex (Fig. 4B), connected to mediuncus and parameres via connecting membrane, remaining part freely movable. Connecting membrane barely sclerotised and flexible, but with definite shape (Fig. 4B, D). Anterior margin between mediuncus/pseudopenis and parameres from dorsal view shoulder-shaped, with strongly convex (*cv*) area in distal 2/3.

Female genitalia. Gonocoxite VIII located between enlarged sternite VII and tergite VIII (Fig. 5A, C). Gonapophysis located as small lobe ventrally between gonocoxites IX. Spermatheca approximate of equal thickness (Fig. 5B, D), spirally coiled, with two inner coils of medial area and two coils of distal area. Short fertilisation duct and fertilisation channel.

Colour. Head. Yellowish with a slightly reddish tinge that contrasts with yellow colour of prozona (Figs 1A,

C, 2B). Vertex with dark brown uneven transversal band on posterior margin, band spreads from crest of vertex symmetrically to both sides without reaching eyes. Mouthparts same colour as head, except of black tips of mandibles (Fig. 2A, C). Antennae yellowish with a slightly reddish tinge. **Prothorax.** Basic colour yellow. Prozona lighter than metazona (Fig. 1A, C). Dorsolateral, a black transversal band appears over maculae, pronatal groove and pronatal humps. Band comprised by laterally connected black spots over maculae and pronatal humps (Figs 1A, 2B, 3A). Spots on pronatal humps do not converge centrally (Fig. 2B). Female: Only hinted black marks on pronatal humps. Black spot over maculae as in male (Fig. 3B). Black spots over maculae and pronatal humps not connected laterally (Fig. 3B). **Meso- and metathorax.** Uniformly black. **Foreleg.** Coxa and separation ring black with small yellow area distally (Fig. 2C). Trochanter yellowish-brown with a red tinge. Ventral lower margin of femur light brown to yellowish. Tibia and tarsus light brown to yellowish. **Mid- and hindleg.** Coxae and trochanters black. Femora black, very

distal part brownish. Tibiae and tarsi reddish-brown with a small black spot dorsally in the proximal third. **Abdomen.** Basic colour black. Anterior area of second pleurite yellowish, tergites with pale marking medially on posterior margin (Fig. 1A), sternite VIII with orange-brown longitudinal stripe medially. Tergite X (ectoproct) reddish-brown. Female abdomen orange-brown (Fig. 1C). Tergite I black, tergite II black with posterior margin orange-brown, tergite III orange-brown with anterior margin black (Fig. 1C). Sternite I–III black, sternite IV–VI black with posterior margin orange-brown. **Fore-wing.** Brown anterior wing band, oblique brown band runs over 3M, not reaching posterior margin of wing (Fig. 1A). Oblique apical dark band at posterior wing margin, comprises branches from first and second proximal radial veins originating from *rarp3* (Fig. 1A). Central area of wing and 1CuA hyaline. Posterior margin of wing pale light brown. Pterostigma light yellow. Wing veining predominantly brown, veins of pterostigma and anterior radial cell II (*rarp2*), veins adjacent of *rarp2* and distal part of veins of *rarp1* yellow (Fig. 1A). Female with 3M reaching posterior wing margin (Fig. 1C). Oblique apical dark band at posterior wing margin, comprises branches from last three distal radial veins originating from *rarp2* and first and second proximal radial veins originating from *rarp3* (Fig. 1C). Posterior wing margin distinctly darker pigmented than in male. **Hind-wing.** Brown anterior wing band, hyaline median stripe and lower pale brownish margin. Pterostigma brown with proximal part of underlying subcosta yellow. Veins of *rarp2* slightly yellowish, remaining veins brown (Fig. 1A). Female with posterior wing margin distinctly darker pigmented than in male (Fig. 1C).

Discussion

Euclimacia is a small, but morphologically markedly diverse genus. Despite the considerable size of individual specimens, which can reach sometimes up to 3 cm body length and their striking colouration in many cases, the number of specimens in scientific collections is very limited. So far, there is still no accurate information about their behaviour and their habitats during the day and at night. *Euclimacia* often represent a by-catch that is caught by scientists specialised in other taxa during light trapping. However, there is no evidence that they are nocturnal. Specific light trapping for *Euclimacia* has, so far, resulted in low numbers of specimens. It can be assumed that, similar to the genus *Climaciella*, during the day, they eat pollen and nectar on flowering plants and prey on other insects (Boyden 1983). Presumably they also occur temporarily in higher tree levels.

Of the 33 species described so far, 30 were described on the basis of a single specimen. The remaining two species were described, based on two (*Euclimacia superba* Lambkin, 1987) and three (*Euclimacia nicobarica* Kaur, 2021) specimens. The series of eight specimens of the

here newly-described species *Euclimacia radioquaesentis* sp. nov. is thus comparatively large.

Seven males and one female of *E. radioquaesentis* were examined. The availability of both sexes provides rare data on potential sexual dimorphism in this genus. Only the descriptions of *E. superba* and *E. nicobarica* are based on both sexes. In *E. nicobarica*, the colour pattern of the female is described as similar to the male, although the female is slightly smaller than the male. In *E. superba*, there are a few differences in the colour pattern and size. The colour differences occur in slightly different colour shades and a few markings. The head of the female is slightly paler and it possesses a transverse band across the antennae basis, which is absent in the male. The female possesses a large dark transverse band on tergite III, the male in the same location possesses a small black median mark. In the female, the ectoproct is black-brown with a brownish-yellow spot. The ectoproct of the male is dark orange-brown without any spot. Wings and other body parts have the same colour. The female is slightly larger than the male. The size depends to a certain extent on the larvae's food supply (size of the spider egg sac) and is, therefore, considered natural and not as a sexual trait (Lietzenmayer et al. 2022). In addition, Handschin's re-description of *Euclimacia morosa* was based on three non-type specimens of both sexes. Handschin described the female and the male as identical in colour (Handschin 1961).

In *E. radioquaesentis*, there are differences in colouration between females and males. One difference is the transversal band on the prothorax, which is present in both sexes, but reduced in the female. In the males, the pronatal hump is fully covered by a dark mark and this dark mark merges with the dark mark that covers the macula. The pronatal hump of the female has a very faint dark mark at the apex, which does not merge with the dark mark of the macula. In general, the prothorax of the female appears narrower and less wrinkled than of the male (Fig. 3). The pronatal humps are barely developed (Fig. 3B). Whether this is a sexual dimorphism or whether these differences are based on the smaller body size of the female cannot be finally clarified here.

Furthermore, the abdomen of the male is predominantly black with a few brownish markings. The abdomen of the female has a significantly higher amount of brown, so that, apart from the anterior two black segments, the abdomen appears predominantly brown. The predisposition for this brown colouration of the abdomen is also present in the males, as the brown markings on the tergites indicate. The wings also differ, although only slightly, in colouration. The wings of the female appear more contrasting. The area along the posterior wing margin is darker than in the male and the oblique band above 3M in the fore-wing reaches the posterior wing margin. As a result, the hyaline median stripe is enhanced, especially in the fore-wing (Fig. 1C). The most striking feature of the differently-coloured pterostigmata and the adjacent veining is identical.

Intraspecific variation in *Euclimacia* has also been recorded only occasionally. There are observations of intraspecific variations in *Euclimacia badia* Okamoto, 1910. Ohl (2004b) examined about 20 specimens from Taiwan, from where the type specimen was collected. The basic colour ranges from reddish-brown to almost black. Within the 20 specimens, there is a morphotype type with a predominantly reddish colour, another morphotype with a predominantly black colour and numerous intermediate stages. Variations within *E. radioquaesentis* are hardly recognisable. The differences are limited to slight variations in the yellowish shades, which may also be due to the drying process. Colouration can deviate from that of the living specimen due to the drying and ageing process. From observations of other specimens of *Euclimacia* of which the appearance in the dried and living state is known, it can be said that black colour patterns fade to dark brownish and yellow colouring appears less intense in the dried state, but rather goes into ochre or sand colour.

Furthermore, the individuals differ slightly in size. Variation also occurs in the wing venation. There are variations between specimens, but also asymmetry within the same specimen. The asymmetry of subcostal veinlets within the wings of one specimen seems to be the norm.

Intraspecific variability within this genus is still difficult to assess and, in an ongoing revision, as much material as possible from this genus will be investigated. The trend indicates that there are species with hardly any intraspecific variability, as in the example of *radioquaesentis* and species with clear intraspecific variability, as in *badia*. Adaptation to morphologically different mimicry models (i.e. aculeate wasps) in different regions may result in intraspecific variability.

The description of *E. radioquaesentis* was linked to a popular science event of the Museum für Naturkunde Berlin and ‘Inforadio vom rbb’, one of Berlin’s local radio stations, in choosing the name for this species. Three more species from different taxa were also involved, the descriptions of two of which have already been published (a species of shrimp by Klotz et al. (2023); a staphylinid species by Frisch and Mainda (2022)). A species profile was broadcast by ‘Inforadio’ and listeners were asked to propose a scientific name (the species epithet). Amongst the suggestions submitted, the species name *E. radioquaesentis* was picked as being most suitable for species named by radio listeners. The goal of this radio event was to raise awareness of the high number of still undescribed species and to let interested citizens participate in taxonomic projects.

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